# Electric Actuators
# Type 5824 without fail-safe action
# Type 5825 with fail-safe action

Three-step version

## Mounting and Operating Instructions

## EB 5824-1 EN

Edition January 2015

**Note on these mounting and operating instructions**

These mounting and operating instructions (EB) assist you in mounting and operating the device safely. The instructions are binding for handling SAMSON devices.

➔ For the safe and proper use of these instructions, read them carefully and keep them for later reference.

➔ If you have any questions about these instructions, contact SAMSON's After-sales Service Department (aftersalesservice@samson.de).

**Referenced documentation**

The documents for the devices used in combination with the electric actuator apply in addition to these mounting and operating instructions.

The mounting and operating instructions for all supplied devices are included in the delivery. The latest versions of the documents are available on our website at www.samson.de > Product documentation.

**Definition of signal words**

***DANGER!***
*Hazardous situations which, if not avoided, will result in death or serious injury*

***WARNING!***
*Hazardous situations which, if not avoided, could result in death or serious injury*

***NOTICE***
*Property damage message or malfunction*

***Note:***
*Additional information*

***Tip:***
*Recommended action*

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# 1 General safety instructions

For your own safety, follow these instructions concerning the mounting, start up and operation of the actuator:

– The device is to be mounted, started up or operated only by trained and experienced personnel familiar with the product. According to these mounting and operating instructions, trained personnel refers to individuals who are able to judge the work they are assigned to and recognize possible dangers due to their specialized training, their knowledge and experience as well as their knowledge of the applicable standards.
– Any hazards that could be caused in the valve by the process medium and the operating pressure or by moving parts are to be prevented by taking appropriate precautions.
– The device is designed for use in low voltage installations. For wiring and maintenance, you are required to observe the relevant safety regulations. Only use protective equipment in which the power supply cannot be reconnected inadvertently.
– Before wiring the actuator, disconnect it from the power supply.

To avoid damage to any equipment, the following also applies:

– Proper shipping and storage are assumed.

***Note:***
*Devices with a CE marking fulfill the requirements of the Directives 2004/108/EC and 2006/95/EC.*
*The Declaration of Conformity is available on request.*

# 2 Design and principle of operation

The actuator contains a reversible synchronous motor and a maintenance-free gear. The motor is switched off by torque-dependent limit contacts or in case of overload.

The force of the motor is transmitted to the actuator stem (3) via gear and crank disk. When the actuator stem extends, it pushes against the valve's plug stem. When the actuator stem retracts, the return spring in the valve causes the plug stem to follow the movement (force-locking connection).

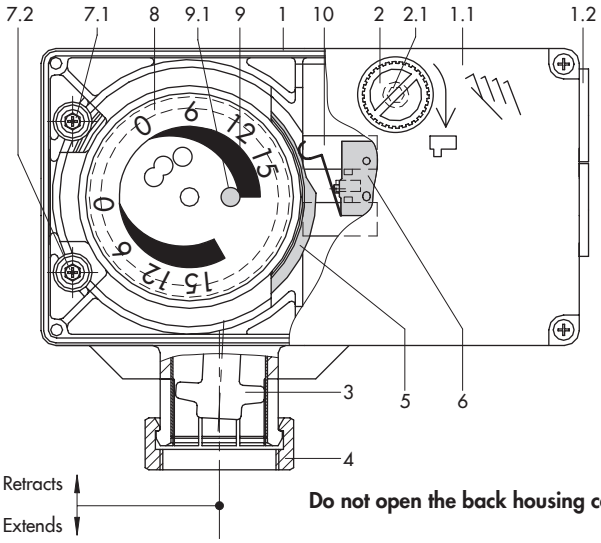
Actuator and valve are connected by the coupling nut (4).

**Type 5824 without fail-safe action**

This actuator without fail-safe action has a handwheel (2) used to manually position the valve. Travel and direction of action can be read off the travel indication scale (9).

**Type 5825 with fail-safe action**

The actuator contains a spring mechanism (8) and an electromagnet. The actuator is moved by the force of the spring to the fail-safe position when the electromagnet (terminals L and N) is de-energized. The direction of action depends on the actuator version and cannot be reversed.




| | |
|---|---|
| 1 | Housing |
| 1.1 | Front cover |
| 1.2 | Cable entry |
| 2 | Handwheel (Type 5824 only) |
| 2.1 | Actuating shaft |
| 3 | Actuator stem |
| 4 | Coupling nut |
| 5 | Cam disk |
| 6 | Limit contact |
| 7.1 | Adjuster for limit contact (bottom contact cam) |
| 7.2 | Adjuster for limit contact (top contact cam) |
| 8 | Spring assembly (Type 5825 only) |
| 9 | Travel indication scale |
| 9.1 | Follower pin |
| 10 | Torque-dependent limit contact |

**Fig. 1:** *Type 5824/5825 Actuator (front cover open), force-locking attachment*

The Type 5825 Actuator is available with fail-safe action **"actuator stem extends"** or **"actuator stem retracts"**.

➔ **The fail-safe action must not be used to control the valve position.**

The Type 5825 Actuator does not have a handwheel (2) on the housing cover. Manual override is possible, after removing the front cover, using a 4 mm Allen key. The actuator returns to its original position as soon as the Allen key is released.

**Version with faster motor**

The Types 5824-13/-23/-33 and Types 5825-13/-23 have a more powerful motor in a housing at the back of the actuator.

**Testing according to DIN EN 14597**

The Type 5825 Electric Actuator with fail-action "actuator stem extends" is tested by the German Technical Inspectorate (TÜV) according to DIN EN 14597 in combination with various SAMSON valves. The register number is available on request.

## 2.1 Additional equipment

– The **resistance transmitter** is linked to the gear and produces a resistance signal between approx. 0 and 1000 Ω (useable range 0 to 800 Ω ) proportional to the valve travel. The resistance transmitter is not suitable for retrofitting.

– On request, the actuator can be fitted with **two limit contacts**. Optionally, the actuators can be equipped with two limit contacts, which are actuated by continuously adjustable cam disks.
The power supply as well as the inputs and outputs are not galvanically isolated. The two additional limit contacts are not suitable for retrofitting.

## 2.2 Technical data · Type 5824

| | | Type | 5824 | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | -10 | -13 | -20 | -23 | -30 | -33 |
| Fail-safe action | | | Without | | | | | |
| Rated travel | | mm | 6 [1] | 6 [1] | 12 | 12 | 15 | 15 |
| Stroking speed | Standard: 0.17 mm/s | | • | – | • | – | • | – |
| | Actuator with faster motor: 0.33 mm/s | | – | • | – | • | – | • |
| Transit time for rated travel | | s | 35 [1] | 18 [1] | 70 | 36 | 90 | 45 |
| Thrust | Extends | N | 700 | 700 | 700 | 700 | 700 | 700 |
| | Retracts | N | – | – | – | – | 700 | 700 |
| Attach-ment | Force-locking | | • | • | • | • | – | – |
| | Form-fit | | – | – | – | – | • | • |
| Manual override | | | Yes | | | | | |
| **Power supply** | | | | | | | | |
| 24 V, 50 Hz | | | • | – | • | – | • | – |
| 230 V, 50 Hz/60 Hz [2] | | | • | • | • | • | • | • |
| 120 V, 60 Hz | | | • | – | • | – | • | – |
| Power consumption | | Approx. VA | 3 | 6 | 3 | 6 | 3 | 6 |
| **Permissible temperatures** | | | | | | | | |
| Ambient | | | 0 to 50 °C | | | | | |
| Storage | | | –20 to +70 °C | | | | | |
| At the actuator stem | | | 0 to 135 °C [4] | | | | | |
| **Safety** | | | | | | | | |
| Degree of protection | | | IP 54 [3] | | | | | |
| Class of protection | | | II (according to EN 61140) | | | | | |
| Overvoltage category | | | II (according to EN 60664) | | | | | |
| Degree of contamination | | | 2 (according to EN 60664) | | | | | |
| Electromagnetic compatibility | | | According to EN 61000-6-2, EN 61000-6-3 and EN 61326 | | | | | |
| Vibration | | | According to EN 60068-2-6 and EN 60068-2-27 | | | | | |
| Compliance | | | CE · EAC | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Additional electrical equipment (not suitable for retrofitting)** | | | | | | |
| **Two limit contacts,** max. 230 V, 1 A | • | • | • | • | • | • |
| **One resistance transmitter**, 0 to 1000 Ω ±15 % (90 % of final value at rated travel); max. 1 mA, 5 V | • | – | • | – | • | • |
| **Materials** | | | | | | |
| Housing, housing cover | Plastic (PPO with glass fiber reinforcement) | | | | | |
| Coupling nut, M32 x 1.5 | Brass | | | | | |
| **Weight** kg (approx.) | **0.75** | **1.00** | **0.75** | **1.00** | **0.75** | **0.75** |

1) Actuators with 6 mm travel can also be used for valves with 7.5 mm travel (45 s transit time, 22.5 s for actuator with faster motor).
2) Special version
3) The degree of protection IP 54 can only be achieved up to device index **.03** when the actuator is installed in the upright position. See last two figures of the configuration ID (Var.-ID) written on the nameplate, e.g. Var.-ID xxxxxxx**. xx**, for the device index.
4) Maximum 130 °C up to device index **.03**. See last two figures of the configuration ID (Var.-ID) written on the nameplate, e.g. Var.-ID xxxxxxx**.xx**, for the device index.

## 2.3 Technical data · Type 5825

| Type | | | 5825 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | -10 | -13 | -20 | -23 | -30 | -33 | -15 | -25 | -35 |
| Fail-safe action | | | With | | | | | | | | |
| Operating direction | | | Extends | | | | | | Retracts | | |
| Rated travel | | mm | 6 [1] | 6 [1] | 12 | 12 | 15 | 15 | 6 [1] | 12 | 15 |
| Stroking speed | | Standard: 0.17 mm/s | • | – | • | – | • | – | • | • | • |
| | | Actuator with faster motor: 0.33 mm/s | – | • | – | • | – | • | – | – | – |
| Transit time for rated travel | | s | 35 [1] | 18 [1] | 70 | 36 | 90 | 45 | 35 [1] | 70 | 90 |
| Transit time for fail-safe action | | s | 4 | 4 | 6 | 6 | 7 | 7 | 4 | 6 | 7 |
| Thrust | Extends | N | 500 | 500 | 500 | 500 | 280 | 280 | 500 | 500 | 280 |
| | Retracts | N | – | – | – | – | 280 | 280 | – | – | 280 |
| Thrust in the event of fail-safe action | | N | 500 | 500 | 500 | 500 | 280 | 280 | – [3] | – [3] | 280 |
| Attach-ment | Force-locking | | • | • | • | • | – | – | • | • | – |
| | Form-fit | | – | – | – | – | • | • | – | – | • |
| Manual override | | | Possible [2] | | | | | | | | |
| **Power supply** | | | | | | | | | | | |
| 24 V, 50 Hz | | | • | – | • | – | • | – | • | • | • |
| 230 V, 50 Hz/60 Hz [4] | | | • | • | • | • | • | • | • | • | • |
| 120 V, 60 Hz | | | • | – | • | – | • | – | • | • | • |
| Power consumption | | Approx. VA | 4 | 8 | 4 | 8 | 4 | 8 | 4 | 4 | 4 |
| **Permissible temperatures** | | | | | | | | | | | |
| Ambient | | | 0 to 50 °C | | | | | | | | |
| Storage | | | –20 to +70 °C | | | | | | | | |
| At the actuator stem | | | 0 to 135 °C [6] | | | | | | | | |
| **Safety** | | | | | | | | | | | |
| Degree of protection | | | IP 54 [5] | | | | | | | | |
| Class of protection | | | II (according to EN 61140) | | | | | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Overvoltage category | II (according to EN 60664) | | | | | | | | |
| Degree of contamination | 2 (according to EN 60664) | | | | | | | | |
| Electromagnetic compatibility | According to EN 61000-6-2, EN 61000-6-3 and EN 61326 | | | | | | | | |
| Vibration | According to EN 60068-2-6 and EN 60068-2-27 | | | | | | | | |
| Compliance | CE · EAC | | | | | | | | |
| **Additional electrical equipment (not suitable for retrofitting)** | | | | | | | | | |
| **Two limit contacts,** max. 230 V, 1 A | • | • | • | • | • | • | • | • | • |
| **One resistance transmitter**, 0 to 1000 Ω ±15 % (90 % of final value at rated travel); max. 1 mA, 5 V | • | – | • | – | • | • | • | • | • |
| **Materials** | | | | | | | | | |
| Housing, housing cover | Plastic (PPO with glass fiber reinforcement) | | | | | | | | |
| Coupling nut, M32 x 1.5 | Brass | | | | | | | | |
| **Weight** kg (approx.) | **1.00** | **1.25** | **1.00** | **1.25** | **1.00** | **1.25** | **1.00** | **1.00** | **1.00** |

1) Actuators with 6 mm travel can also be used for valves with 7.5 mm travel (45 s transit time, 22.5 s for actuator with faster motor).
2) Manual override using 4 mm Allen key (after removing the cover); actuator always returns to fail-safe position after release
3) Safety spring pulls actuator stem to retracted end position; valve operated by valve spring.
4) Special version
5) The degree of protection IP 54 can only be achieved up to device index **.03** when the actuator is installed in the upright position. See last two figures of the configuration ID (Var.-ID) written on the nameplate, e.g. Var.-ID xxxxxxx**.xx**, for the device index.
6) Maximum 130 °C up to device index **.03**. See last two figures of the configuration ID (Var.-ID) written on the nameplate, e.g. Var.-ID xxxxxxx**.xx**, for the device index.

# 3 Attachment to the valve

The actuator is mounted either directly onto the valve or using a yoke depending on the valve version used (Fig. 2).

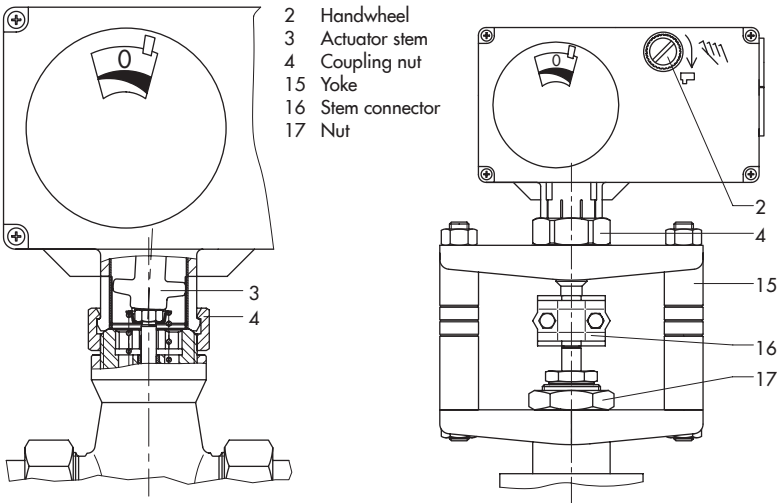
## 3.1 Type 5824 Actuator

### 3.1.1 Force-locking attachment

1. Turn the handwheel (2) counterclockwise to retract the actuator stem.
2. Place the actuator on the valve connection and tighten coupling nut (4) (tightening torque 20 Nm).

### 3.1.2 Form-fit attachment

1. Place the actuator on the yoke and tighten coupling nut (4) (tightening torque 20 Nm).
2. Place actuator with yoke (15) on the valve and tighten the nut (17) (min. tightening torque 150 Nm).
3. Pull plug stem until it reaches the actuator stem or extend actuator stem using the handwheel (2).
4. Position the clamps of the stem connector (16) included in the accessories on the ends of the actuator stem and plug stem and screw tight.




Force-locking attachment with coupling nut, e.g. to Type 3222 Valve

Form-fit attachment with stem connector, e.g. with yoke on Series V2001 Valve

**Fig. 2:** *Attaching actuator and valve*

## 3.2 Type 5825 Actuator

### 3.2.1 Force-locking attachment

**Fail-safe action "actuator stem extends"**

The actuator stem must be retracted before the actuator can be mounted onto the valve. The stem can be retracted either mechanically or electrically. Both methods are described below.

**Retracting the actuator stem mechanically**

1. Unscrew front cover and place a 4 mm Allen key on the red actuating shaft.
2. Retract the actuator stem: Turn Allen key counterclockwise only and **only as far as** the final travel value which is at the point where the torque-dependent limit contact is activated (see Fig. 3).

> ***NOTICE***
> *Risk of damage to the actuator by turning it too far.*
> *Only retract the actuator stem as far as the final travel value.*

3. Hold Allen key in place and fasten valve and actuator together using the coupling nut (tightening torque 20 Nm). Remove Allen key and carefully refasten the front cover.

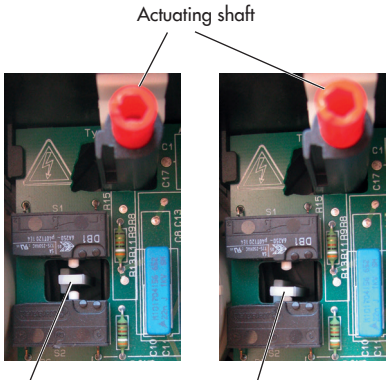



**Fig. 3:** *Tag*

**Retracting the actuator stem electrically**

1. Unscrew front cover.
2. Perform electrical wiring according to Fig. 6 on page 16 and carefully refasten the front cover.
3. Retract actuator stem:
   Switch on power supply and retract the actuator stem electrically until it reaches the end position (voltage applied to eL and N or using controller).

> ***NOTICE***
> *Risk of damage to the actuator due to incorrect connection of the voltage.*
> *Do not apply a voltage to eL and aL at the same time.*

4. Fasten valve and actuator together using the coupling nut (tightening torque 20 Nm).

**Fail-safe action "actuator stem retracts"**

➔ Place the actuator on the valve connection and tighten coupling nut (tightening torque 20 Nm).

### 3.2.2 Form-fit attachment

➔ For fail-safe action "actuator stem retracts" and "actuator stem extends", mount actuator as described in section 3.1.2.

## 3.3 Mounting position

The control valve can be installed in the pipeline in any desired position. However, a suspended mounting position of the actuator is not permissible (see Fig. 4).

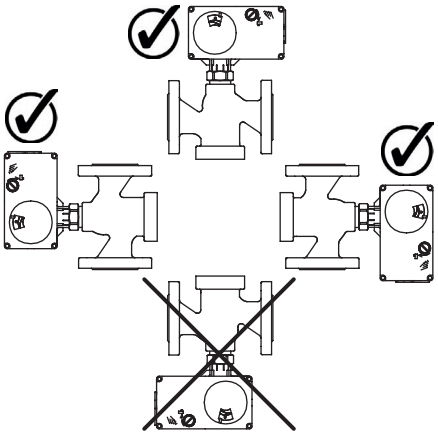


**Fig. 4:** *Mounting position* [1)]

1) The degree of protection IP 54 can only be achieved up to device index .03 when the actuator is installed in the upright position. See the last two figures of the configuration ID (Var.-ID) written on the nameplate (see page 21) for the device index.

## 3.4 Travel indication scale

The travel indication scale has two opposed scales. Which scale is to be used depends on the valve version (Fig. 5).

**Globe and three-way diverting valves**: The driving pin is in position 0 (delivered state).

**Three-way mixing valve:**

➔ Remove scale, turn it and replace it so that the pin is positioned over the appropriate hole (6, 12 or 15) corresponding to the rated travel (6, 12 or 15 mm travel).

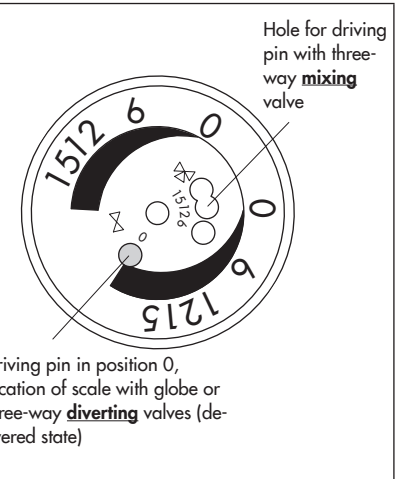



**Fig. 5:** *Travel indication scale*

# 4 Electrical connections

***DANGER!***
***Risk of electric shock***
*For electrical installation, observe the relevant electrotechnical regulations concerning low-voltage installations according to DIN VDE 0100 as well as the regulations of your local power supplier and the accident prevention regulations that apply in the country of use.*

- *Only use a suitable power supply which guarantees that no dangerous voltages reach the device in normal operation and in the event of a fault in the system or any other system parts.*
- *Connect the actuator to the electrical network only after the power supply is first switched off. Make sure the power cannot be switched on unintentionally.*

- If voltage is applied to **eL**, the actuator motor retracts the actuator stem.
- If voltage is applied to **aL**, the actuator motor extends the actuator stem.

***NOTICE***
*Risk of damage to the actuator due to incorrect connection of the voltage. Do not apply a voltage to eL and aL at the same time.*

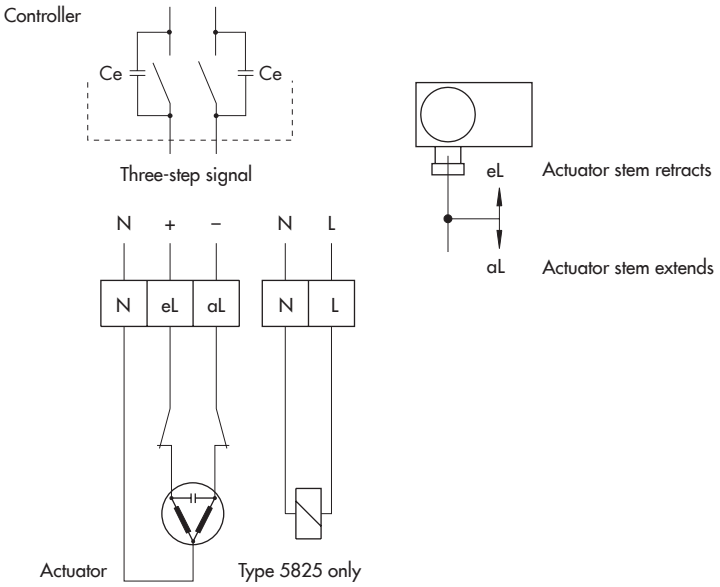
➔ Route wiring through the cable entries (1.2 in Fig. 1) and connect as shown in Fig. 6.

➔ The interference suppression capacitors Ce in the output circuit of the connected controller must not exceed a value of 2.5 nF to ensure the proper functioning of the actuator. A special actuator version is available on request for connection to controllers with larger interference suppression capacitors.

➔ Connect actuators operated in parallel over separate contacts to prevent the actuators hunting in the end positions due to a shared OPEN or CLOSED contact.

***Type 5825:***

➔ Connect power supply to terminals L and N.




**Additional electrical equipment**

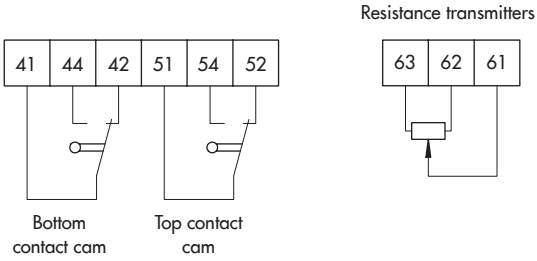



**Fig. 6:** *Electrical connection*

# 5 Handwheel

Travel and direction of action can be read off the scale of the travel indicator (Fig. 7).

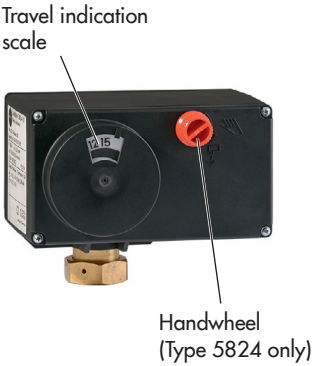



**Fig. 7:** *Type 5824 Electric Actuator*

### Type 5824 Actuator

Use the handwheel to adjust the travel (approx. 4 turns for 1 mm):

– Turn clockwise:
  The actuator stem extends.
– Turn counterclockwise:
  The actuator stem retracts.

### Type 5825 Actuator

***DANGER!***
*Risk of electric shock from exposed live parts.*
*Do not touch live parts on operating the manual override.*

1. Unscrew front cover and place a 4 mm Allen key on the red actuating shaft.

***NOTICE***
*Risk of damage to the actuator by turning it too far.*
*Only retract the actuator stem as far as the final travel value.*

2. Turn the Allen key:

➔ Turn it counterclockwise only for a version with "actuator stem extends" fail-safe action.

➔ Turn it clockwise only for a version with "actuator stem retracts" fail-safe action.

3. Turn the Allen key only as far as the final travel value, which is at the point where the torque-dependent limit contact is activated.
   Once the magnet has been released, the spring mechanism pushes the actuator stem back to the fail-safe position.
4. Remove Allen key and carefully refasten the front cover.

# 6 Additional units

## 6.1 Limit contacts

***DANGER!***
*Risk of electric shock from exposed live parts.*
*Do not touch live parts on adjusting the limit contacts.*

The limit contacts (6, Fig. 1) can optionally be used as make or break contacts.

**Terminal assignment (Fig. 6):**

– Terminals 41, 44, 42:
  → Bottom cam disk, adjuster 7.1
– Terminals 51, 54, 52:
  → Top cam disk, adjuster 7.2

1. Unscrew front cover.
2. Move the actuator stem to the position at which switching point is to be activated.
3. Use a 4 mm Allen key to turn the adjusters (7.1 or 7.2 in Fig. 1) up to the point where the contact is triggered.

***Tip:***
*The angle of rotation of the cam disks is limited. Therefore, use preferably the top adjuster (7.1) for the upper travel range and the bottom adjuster (7.2) for the lower travel range.*

## 6.2 Resistance transmitters

As the valve passes through its travel range, the resistance value changes from 0 Ω to approx. 80 % of its nominal value. Turn a screwdriver placed on the slotted shaft to calibrate the resistance transmitter.

**Calibrating the actuator with an extended actuator stem at 0 Ω**

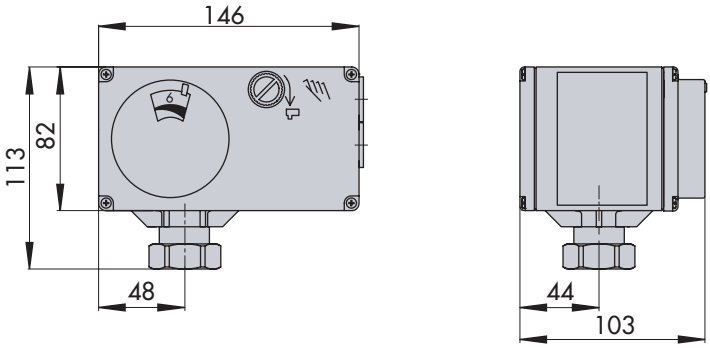
1. Connect ohmmeter to terminals 61 and 62.
2. Extend the actuator stem to its end position.
3. Turn the resistance transmitter counterclockwise as far as it will go. The ohmmeter indicates the initial value of approx. 0 Ω .

**Calibrating the actuator with a retracted actuator stem at 0 Ω**

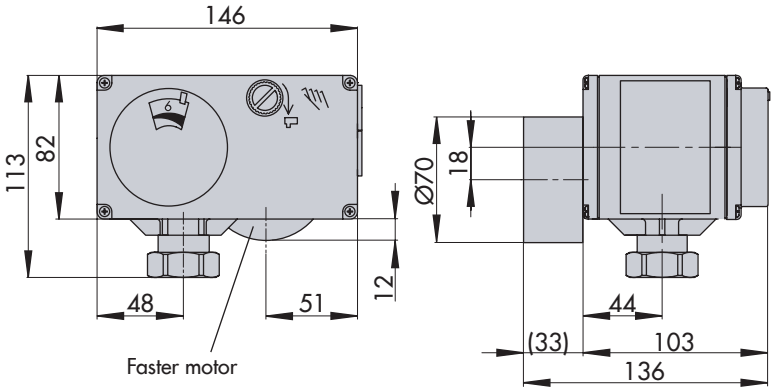
1. Connect ohmmeter to terminals 61 and 63.
2. Retract the actuator stem to its end position.
3. Turn the resistance transmitter clockwise as far as it will go. The ohmmeter indicates the initial value of approx. 0 Ω .
4. **Only for actuators with 6 or 12 mm travel:** Slowly turn the resistance transmitter counterclockwise up to the point where the resistance changes from 0 Ω.

# 7 Dimensions in mm

**Type 5824-10 and Types 5825-10/-15/-25**

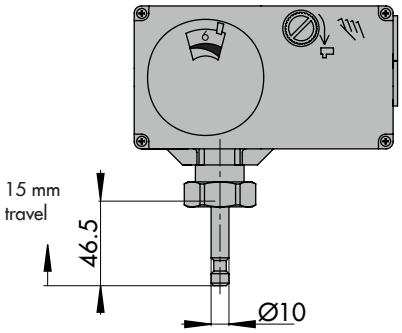



**Types 5824-13/-23/-33 and Types 5825-13/-23** (version with faster motor)

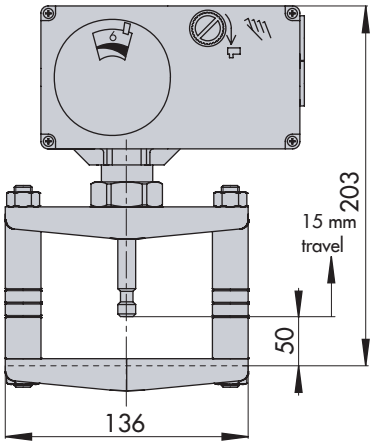


**Type 5824-30 and Types 5825-30/-33/-35**

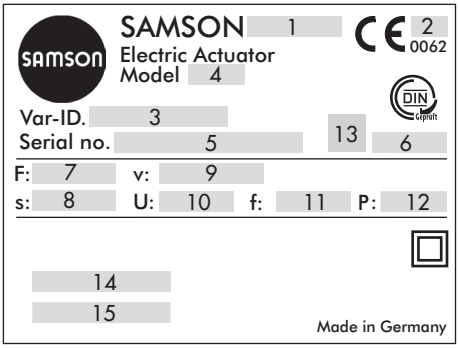
Actuator without yoke




Actuator with yoke (1400-7414)



# 8 Nameplate




1 Type designation
2 Year of manufacture
3 Configuration ID (Var.-ID)
4 Model designation (Type 5825 only)
5 Serial no.
6 DIN registration number (Type 5825 only)
7 Thrust
8 Rated travel
9 Stroking speed
10 Power supply
11 Power line frequency
12 Power consumption
13 Fail-safe action (Type 5825 only)
Extends Retracts
14 Resistance transmitter
15 Limit contact

# 9 Customer inquiries

Please submit the following details:

– Type designation
– Configuration ID (Var.-ID)
– Serial no.

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